



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Canadian  
Coast Guard

Garde côtière  
canadienne



## **APPENDIX B3: DRAWINGS**

## CONCRETE & EPOXY

FORMS MAY EITHER BE KEPT DE-WATERED OR CONTAIN STANDING WATER DURING CONSTRUCTION, PROVIDED REQUIREMENTS FOR EACH CASE ARE MET AS FOLLOWS:

IF INSIDE OF FORM IS KEPT DE-WATERED AND DRY DURING PLACEMENT OF REINFORCING AND POURING OF CONCRETE, CONCRETE MAY BE POURED IN CONVENTIONAL MANNER (CHUTE). ENSURE DRILLED HOLES ARE FREE OF STANDING WATER WHEN EPOXYING THE VERTICAL REBAR.

IF INSIDE OF FORM IS NOT KEPT DEWATERED AND WILL HAVE STANDING WATER DURING PLACEMENT OF REINFORCING AND POURING OF CONCRETE, THEN A TEMPLATE FOR DRILLING THE HOLES FOR THE VERTICAL BARS SHALL BE USED. ALSO, THE CONCRETE SHALL BE PLACED USING THE TREMIE METHOD, AND THE MIX DESIGN TO HAVE ANTI-WASH ADDITIVE.

IN GENERAL, CONTRACTOR SHALL BE EXPERIENCED IN PLACING EPOXYED REBAR IN WET OR SUBMERGED CONDITIONS AS REQUIRED.

CONFORM TO CSA STANDARDS CAN3-A23.1-A23.3 AND THEIR SUPPLEMENTS.

TOLERANCES: CONFORM TO CSA STANDARD CAN3-A23.1

PORTLAND CEMENT WATER AND AGGREGATES TO CONFORM TO CSA A23.1 AND CAN3-A5.

AIR ENTRAINMENT ADMIXTURE: TO CSA STANDARD A266.1.

CHEMICAL ADMIXTURES: TO CSA STANDARD A266.2.

CURING/SEALING COMPOUND: TO ASTM C309.

ALL REINFORCING STEEL SHALL BE GRADE 400 MPa, CSA G30.18, EPOXY COATED.

INSTALL EPOXY ADHESIVE IN CONFORMANCE WITH MANUFACTURER'S INSTRUCTIONS. EPOXY ADHESIVE TO BE HILTI HIT-RE 500 V3.

USE VIBRATORS FOR PLACEMENT OF CONCRETE.

FOR READY-MIX CONCRETE THE MAXIMUM TIME PERMITTED BETWEEN CHARGING THE MIXER AND FINAL DEPOSIT IS 90 MINUTES. THERE IS NO TOLERANCE FOR ADDITIONAL TIME SPANS UNLESS A CONCRETE RETARDER IS USED.

EXPOSED CONCRETE SHALL BE FREE FROM HONEYCOMBING, VOIDS, LOSS OF FINES, VISIBLE FLOW LINES AND COLD JOINTS, CHIPS AND SPALLS.

PROTECT FRESH CONCRETE FROM PREMATURE DRYING, SUNSHINE, EXCESSIVELY HOT OR COLD TEMPERATURES AND MECHANICAL INJURY, MAINTAIN AT A RELATIVELY CONSTANT TEMPERATURE FOR AS LONG AS REQUIRED FOR HYDRATION OF THE CEMENT AND CURING OF THE CONCRETE.

SUPPLEMENTAL ADMIXTURES IMPACTING PLASTIC AND HARDENED PERFORMANCE SHALL BE SUBJECT TO APPROVAL OF COAST GUARD.

PLACEMENT OF REINFORCEMENT TO BE CONFIRMED BY COAST GUARD PRIOR TO CONCRETE PLACEMENT.

CONTRACTOR TO PROVIDE CONCRETE TESTING FOR 7 DAY AND 28 DAY COMPRESSIVE STRENGTH. ALSO PROVIDE TESTING FOR SLUMP AND AIR CONTENT. TESTING REPORTS TO BE SUBMITTED TO COAST GUARD FOR REVIEW.

TOWER SHALL NOT BE ERECTED UNTIL CONCRETE TESTING INDICATES AT LEAST 75% OF 28 DAY COMPRESSIVE STRENGTH

REFER TO COAST GUARD SPECIFICATIONS FOR FURTHER CONCRETE REQUIREMENTS

### CLASS OF CONCRETE

PROVIDE NORMAL DENSITY CONCRETE TO ACHIEVE THE FOLLOWING PROPERTIES:

- CLASS OF EXPOSURE: C-1
- CEMENT TYPE: 10
- MINIMUM COMPRESSIVE STRENGTH: 5076psi (35MPa)
- MAXIMUM WATER CEMENT RATIO: 0.50
- AIR ENTRAINMENT: 5%-8%
- NOMINAL SIZE OF COURSE AGGREGATE: 3/4" (20MM)
- SLUMP AT 3" ±1" (75MM ±25MM)
- CURING REGIME TYPE: 2, (7 DAYS TOTAL AT >10°C)

## SUBMITTALS

CONTRACTOR SHALL SUBMIT A SUMMARY OF CONCRETE PROPERTIES WITH CONSTRUCTION PLAN. SUBMIT TO COAST GUARD FOR REVIEW.

SUBMIT REBAR SHOP DRAWINGS FOR COAST GUARD REVIEW

FORMWORK AND FALSEWORK SHALL BE AS DETAILED IN APPROVED CONSTRUCTION PLAN. FOR DE-WATERED INSTALLATION, THE CONSTRUCTION PLAN SHALL SHOW ENGINEERED METHOD OF KEEPING WATER OUT OF THE FORM, EITHER WITH CAISSON AROUND FORM, OR USING THE FORM ITSELF.

CURING SHALL BE COMPLETED IN ACCORDANCE WITH APPROVED CONSTRUCTION PLAN

ANY ALTERNATE PRODUCTS OR PROCEDURES MUST BE APPROVED BY THE COAST GUARD

## BEDROCK

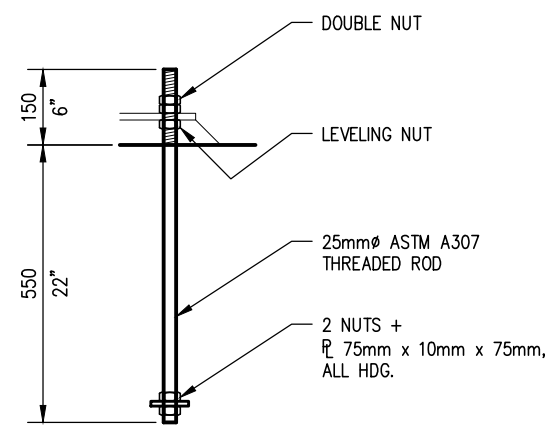
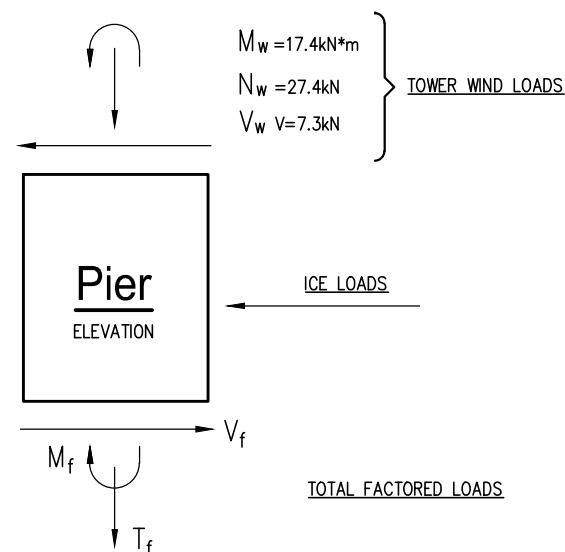
VERTICAL REBAR SHALL BE EMBEDDED IN COMPETENT BEDROCK HAVING A MINIMUM COMPRESSIVE STRENGTH OF 5076 psi (35 MPa). SUITABILITY OF BEDROCK TO EITHER BE VERIFIED BY A GEOTECHNICAL ENGINEER, OR APPROVED BY COAST GUARD PERSONNEL.

## DESIGN LOAD NOTES

**TOWER WIND LOADS:** WIND TOWER LOADS AS PROVIDED BY CANADIAN COAST GUARD, AND ARE SHOWN FACTORED

**ICE LOADS:** ICE LOADS HAVE BEEN DETERMINED IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE CAN/CSA-S6.

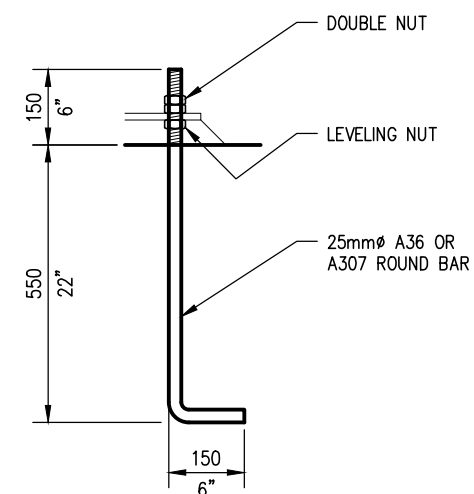
**TOTAL FACTORED LOADS:** FOR TOTAL FACTORED DESIGN FORCES AND MOMENTS ON BASE OF PIER, SEE DWGS. s2.0 AND s3.0 AS APPLICABLE.



\* ALL COMPONENTS HOT DIP GALVANIZED.

### Typ. Anchor Bolt Detail

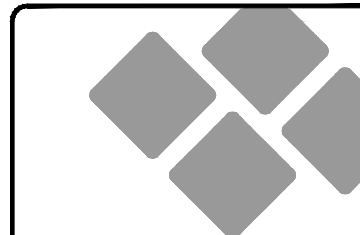
SCALE: 1:15



\* ALL COMPONENTS HOT DIP GALVANIZED.

### Alternate Anchor Bolt Detail

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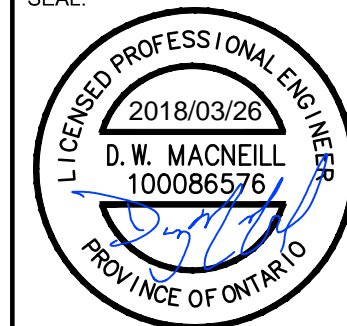


**STEM**  
ENGINEERING GROUP

### REVISIONS:

NO.	DESCRIPTION	DATE

SEAL:



CLIENT:

FISHERIES AND OCEANS  
CANADIAN COAST GUARD

PROJECT:

FOUNDATION FOR 16'-0"  
PIPEMAST NAVIGATION  
BEACONS

DRAWING:

GENERAL NOTES  
DESIGN LOADS  
ANCHOR BOLT DETAIL

SCALE: N.T.S.

PLOT SCALE: 1:1

STEM PROJ. NO: 17266

CAD FILE: 17266 s0.0

FORMAT SIZE: 280mmx432mm

DRAWN: TAB

DESIGNED: DMAC

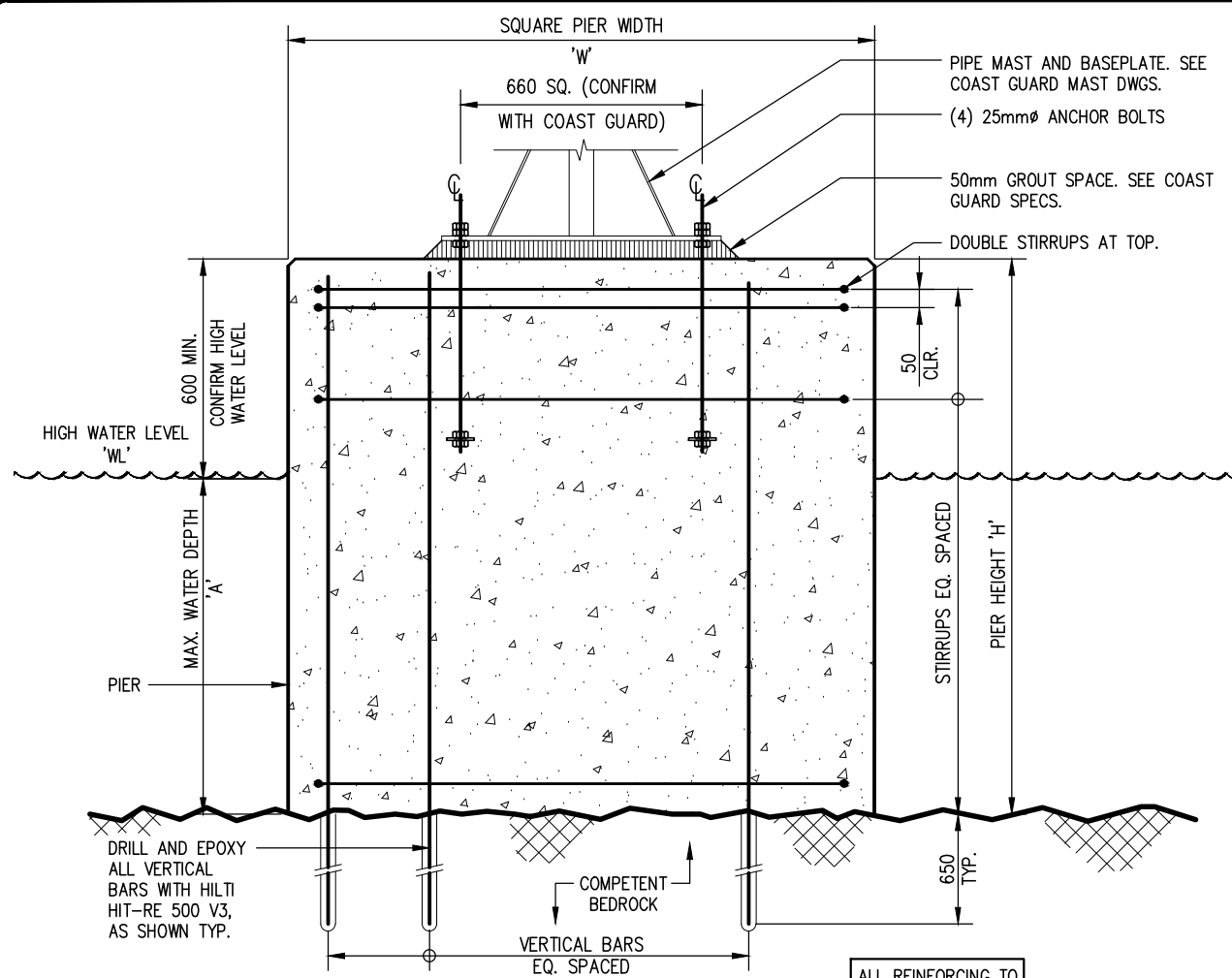
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DATE: 18.03.26

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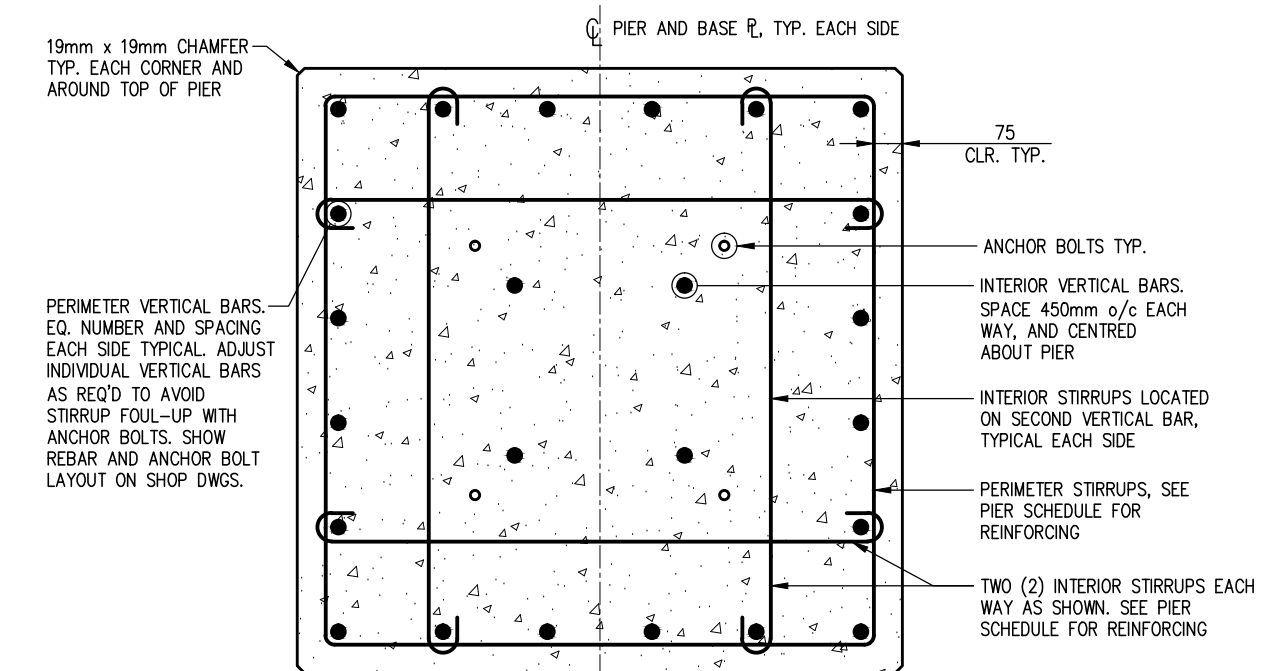
1 OF 4

s0.0



SECTION-VIEW (SQUARE PIER)

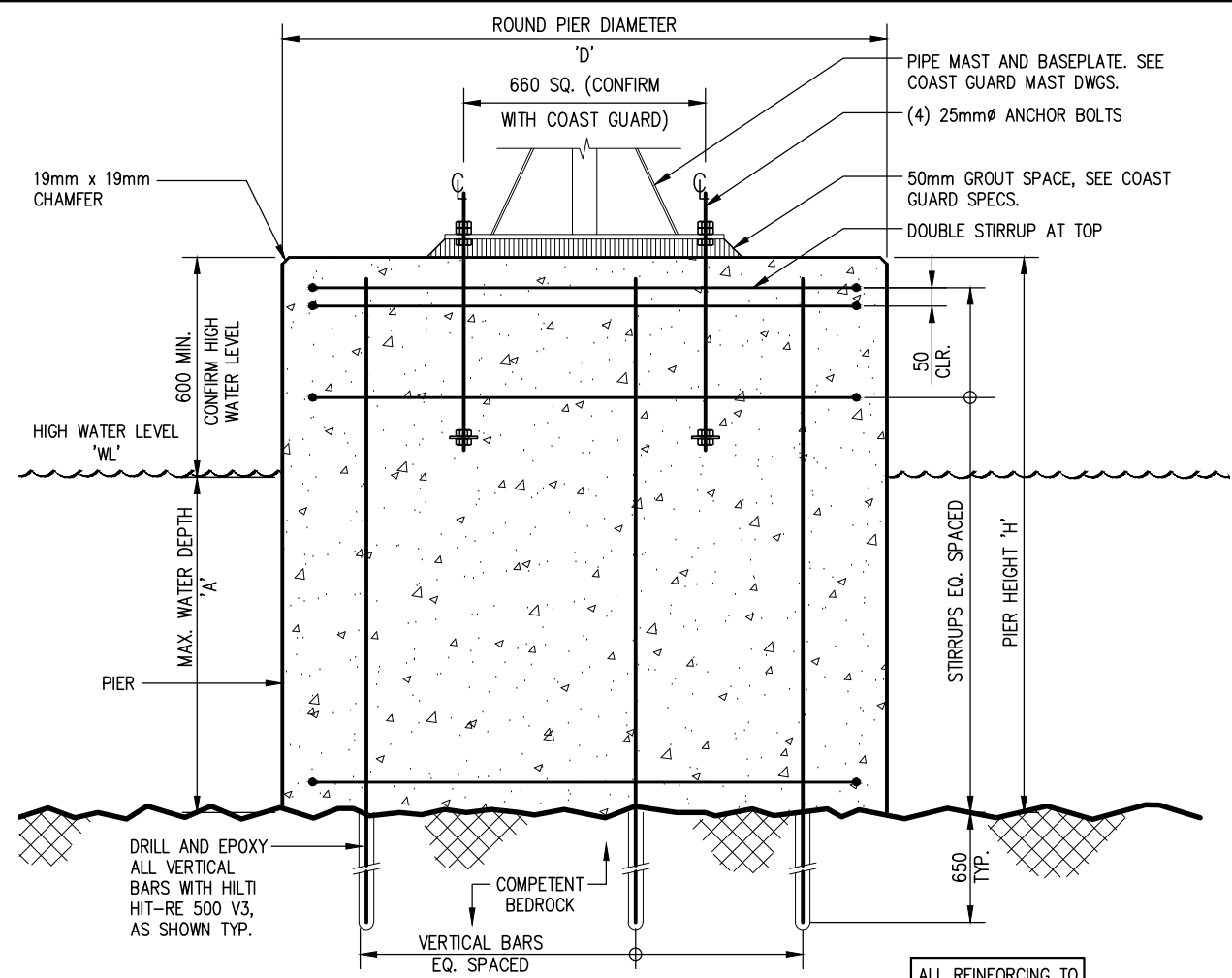
ALL REINFORCING TO BE EPOXY COATED



PLAN-VIEW (SQUARE PIER)

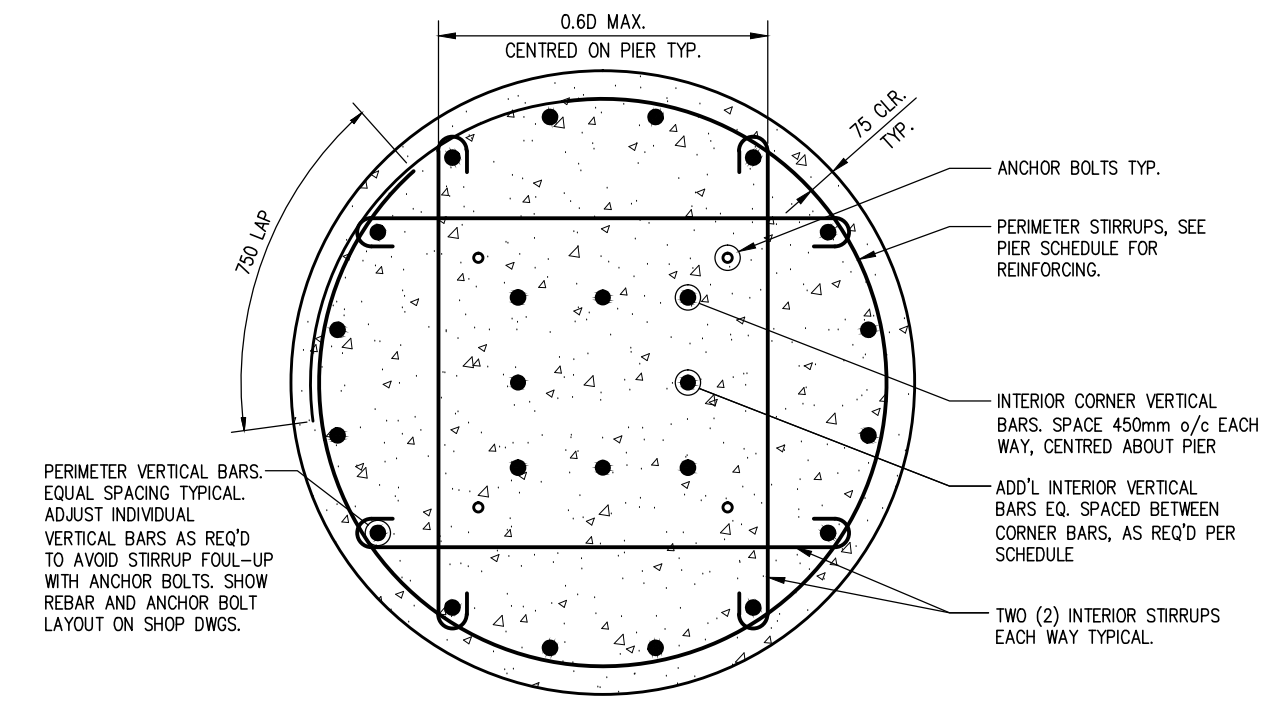
4.87m (16') PIPEMAST FOUNDATION PIER

SOUTHERN ONTARIO PIER SCHEDULE, SEE DWG. s2.0.  
NORTHERN ONTARIO PIER SCHEDULE, SEE DWG. s3.0.



SECTION-VIEW (ROUND PIER)

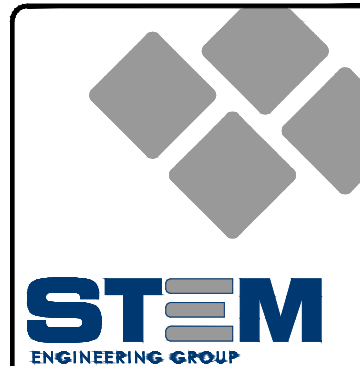
ALL REINFORCING TO BE EPOXY COATED



PLAN-VIEW (ROUND PIER)

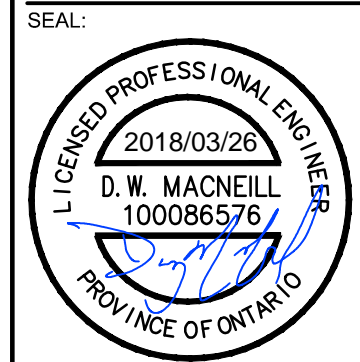
4.87m (16') PIPEMAST FOUNDATION PIER

SOUTHERN ONTARIO PIER SCHEDULE, SEE DWG. s2.0.  
NORTHERN ONTARIO PIER SCHEDULE, SEE DWG. s3.0.



REVISIONS:

NO.	DESCRIPTION	DATE



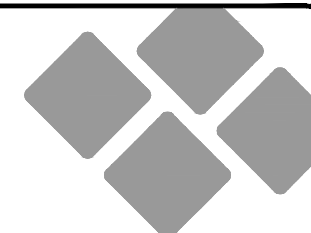
CLIENT:  
FISHERIES AND OCEANS  
CANADIAN COAST GUARD

PROJECT:  
FOUNDATION FOR 16'-0"  
PIPEMAST NAVIGATION  
BEACONS

DRAWING:  
SQUARE PIER DETAILS  
ROUND PIER DETAILS

SCALE: AS NOTED  
PLOT SCALE: 1:1  
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CAD FILE: 17266 s1.0  
FORMAT SIZE: 280mmx432mm  
DRAWN: TAB  
DESIGNED: DMAC  
CHECKED: DMAC  
DATE: 18.03.26

DRAWING:  
2 OF 4 **s1.0**



**STEM**  
ENGINEERING GROUP

REVISIONS:		
NO.	DESCRIPTION	DATE

SEAL:



CLIENT:

FISHERIES AND OCEANS  
CANADIAN COAST GUARD

PROJECT:

FOUNDATION FOR 16'-0"  
PIPEMAST NAVIGATION  
BEACONS

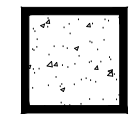
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PIER SCHEDULES  
NORTHERN ONTARIO

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DESIGNED: DMAC  
CHECKED: DMAC  
DATE: 18.03.26

DRAWING:  
4 OF 4 **s3.0**

**Square Pier: 'Northern Ontario' Classification: North of Ottawa and Extends to Kenora & Big Woods Lake as the Limit**



Freezing Index 3000 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Square Pier Width 'W' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.050	8-25M's	0	15M's @300	0	0	9	22	-43
0.305	0.905	1.050	12-25M's	0	15M's @300	0	305	630	114	139
0.610	1.210	1.200	16-30M's	4-30M's	15M's @300	0	610	1433	456	651
0.915	1.515	1.500	20-35M's	4-35M's	15M's @300	15M's @300	832	2438	1237	1233
1.220	1.820	1.800	24-35M's	4-35M's	15M's @300	15M's @300	832	2924	2373	1220
1.525	2.125	1.900	28-35M's	4-35M's	15M's @300	15M's @300	832	3086	3447	1202
1.830	2.430	2.000	32-35M's	4-35M's	15M's @300	15M's @300	832	3248	4619	1180

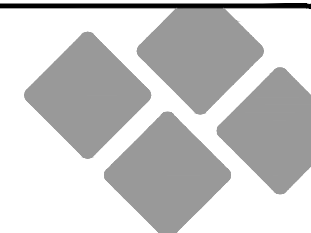
**Round Pier: 'Northern Ontario' Classification: North of Ottawa and Extends to Kenora & Big Woods Lake as the Limit**



Freezing Index 3000 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Round Pier Diameter 'D' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.350	8-25M's	0	15M's @300	0	0	9	22	-48
0.305	0.905	1.350	12-25M's	0	15M's @300	0	305	620	113	137
0.610	1.210	1.350	12-30M's	4-30M's	15M's @300	15M's @300	610	1235	396	651
0.915	1.515	1.650	16-35M's	4-35M's	15M's @300	15M's @300	832	2055	1046	1232
1.220	1.820	1.800	20-35M's	4-35M's	15M's @300	15M's @300	832	2241	1824	1223
1.525	2.125	2.000	24-35M's	6-35M's	15M's @300	15M's @300	832	2490	2785	1207
1.830	2.430	2.000	24-35M's	8-35M's	15M's @300	15M's @300	832	2490	3546	1193



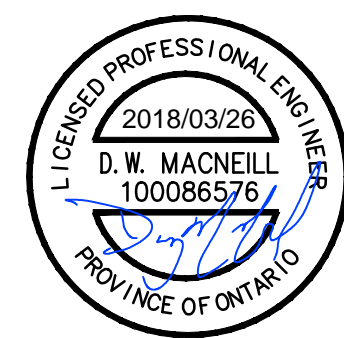


**STEM**  
ENGINEERING GROUP

REVISIONS:

NO.	DESCRIPTION	DATE

SEAL:



CLIENT:  
FISHERIES AND OCEANS  
CANADIAN COAST GUARD

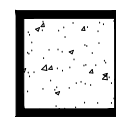
PROJECT:  
FOUNDATION FOR 16'-0"  
PIPEMAST NAVIGATION  
BEACONS

DRAWING:  
PIER SCHEDULES  
SOUTHERN ONTARIO

SCALE: AS NOTED  
PLOT SCALE: 1:1  
STEM PROJ. NO: 17266  
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FORMAT SIZE: 280mmx432mm  
DRAWN: TAB  
DESIGNED: DMAC  
CHECKED: DMAC  
DATE: 18.03.26

DRAWING:  
3 OF 4 **s2.0**

**Square Pier: 'Southern Ontario' Classification: Ottawa & Huntsville Inclusive and All Areas Extending Southwards**



Freezing Index 1800 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Square Pier Width 'W' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.050	8-25M's	0	15M's @300	0	0	9	22	-43
0.305	0.905	1.050	12-25M's	0	15M's @300	0	305	630	114	139
0.610	1.210	1.200	16-30M's	0	15M's @300	0	610	1433	456	651
0.915	1.515	1.200	12-35M's	4-35M's	15M's @300	0	644	1512	917	724
1.220	1.820	1.400	16-35M's	4-35M's	15M's @300	0	644	1764	1606	715
1.525	2.125	1.600	20-35M's	4-35M's	15M's @300	15M's @300	644	2015	2447	698
1.830	2.430	1.800	24-35M's	4-35M's	15M's @300	15M's @300	644	2266	3442	674

**Round Pier: 'Southern Ontario' Classification: Ottawa & Huntsville Inclusive and All Areas Extending Southwards**

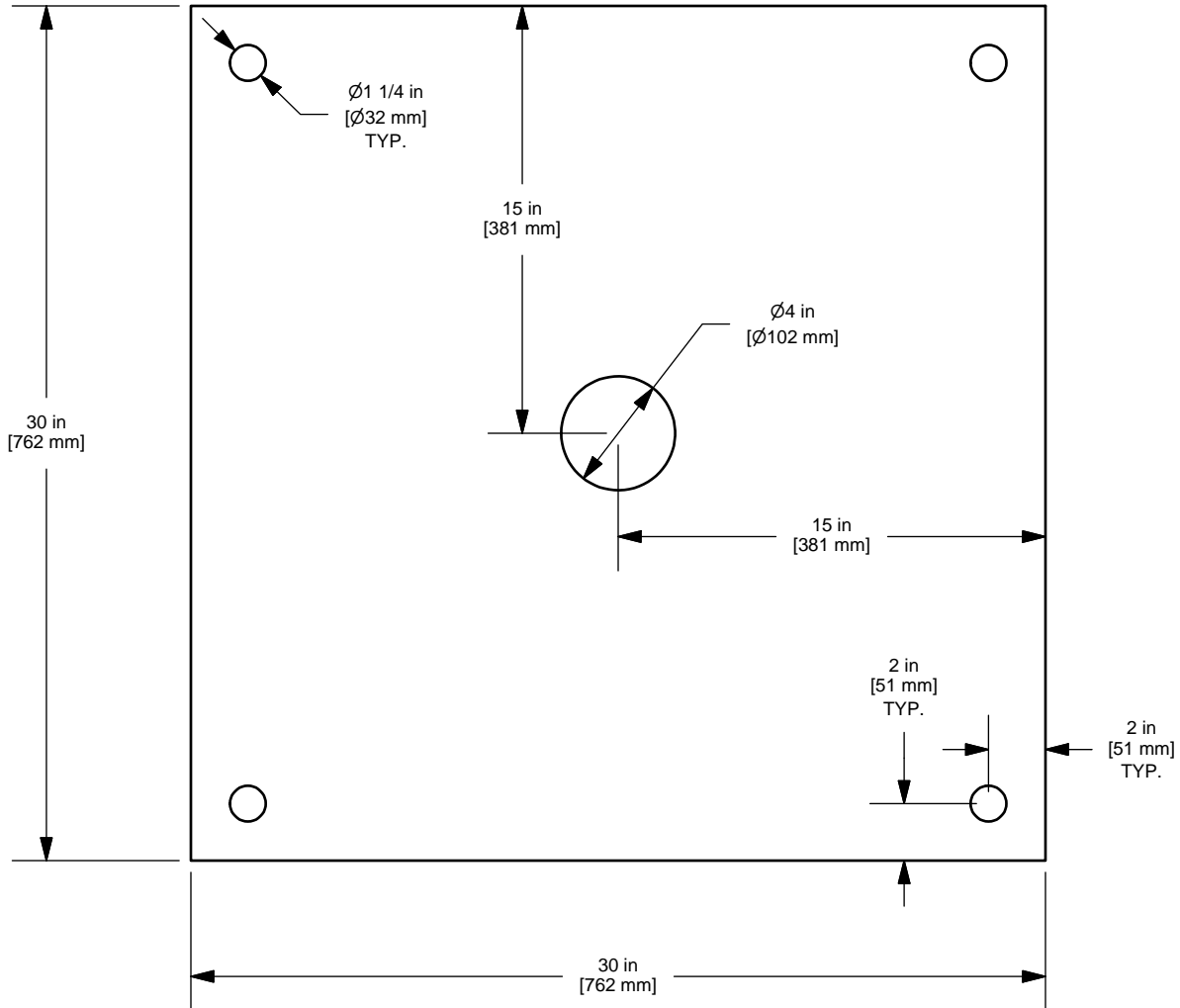
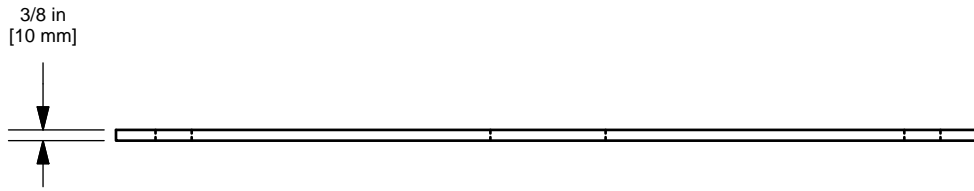


Freezing Index 1800 F° Deg. Days

Pier Geometry			Pier Reinforcing				Total Factored Ice & Wind Forces on Base of Pier (S6-06 Bridge Code)			
Water Depth 'A' (m)	Pier Height 'H' (m)	Round Pier Diameter 'D' (m)	Perimeter Vertical Bars Total	Interior Vertical Bars Total	Perimeter Stirrups Typical	Interior Stirrups Typical	Design Ice thickness (mm)	Vf (kN)	Mf (kN-m)	Tf (kN)
0.000	0.600	1.350	8-25M's	0	15M's @300	0	0	9	22	-48
0.305	0.905	1.350	12-25M's	0	15M's @300	0	305	620	113	137
0.610	1.210	1.350	12-30M's	4-30M's	15M's @300	15M's @300	610	1235	396	651
0.915	1.515	1.500	12-35M's	4-35M's	15M's @300	15M's @300	644	1449	879	724
1.220	1.820	1.500	16-35M's	4-35M's	15M's @300	15M's @300	644	1449	1323	716
1.525	2.125	1.650	18-35M's	4-35M's	15M's @300	15M's @300	644	1593	1940	704
1.830	2.430	1.800	20-35M's	4-35M's	15M's @300	15M's @300	644	1737	2645	688

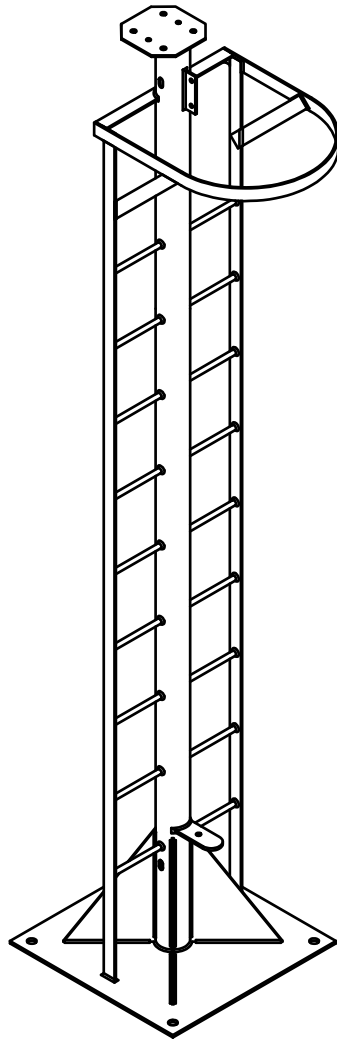
inches

millimètres

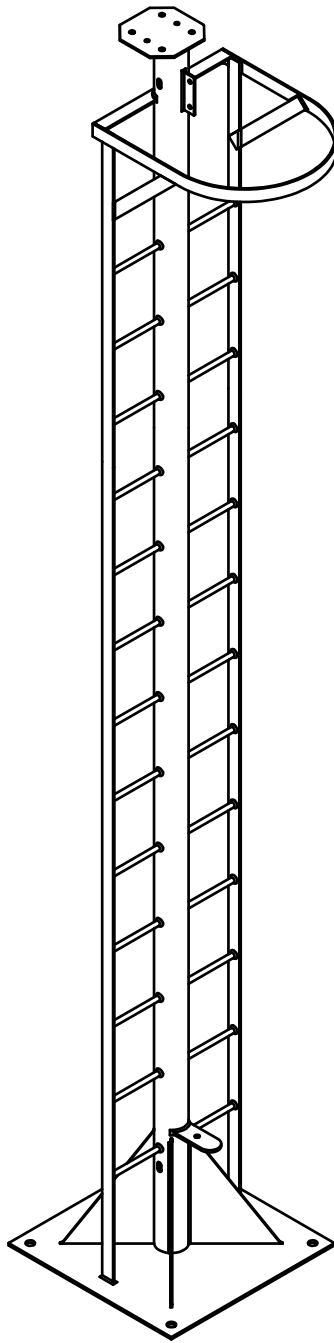


	Fisheries and Oceans Canada	Pêches et Océans Canada
	Canadian Coast Guard	Garde côtière Canadienne
CCG ref. no. - no. réf. GCC EWTM-8010-6	scale - échelle AS SHOWN	

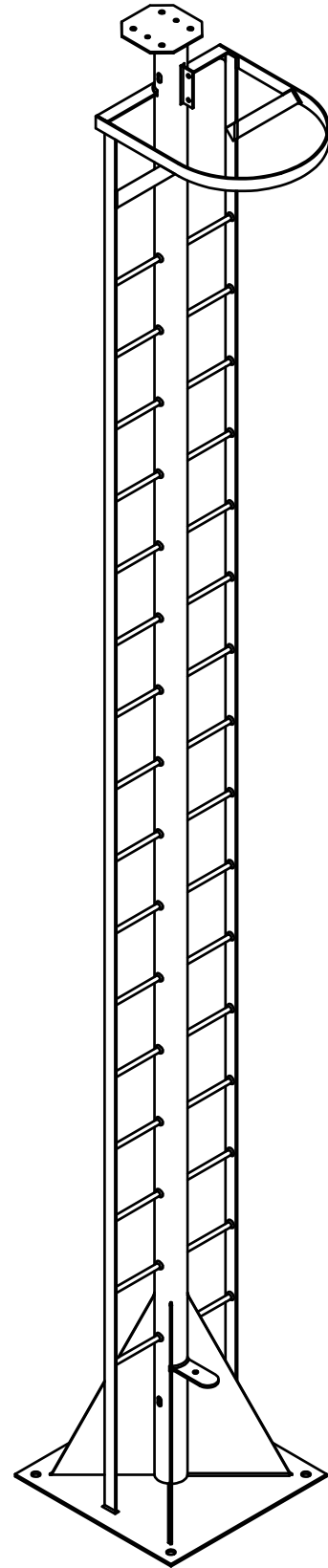
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			drawing no. - no. dessin EWTM-8010-6	sheet-feuille 10/25
			rev 0	A



12' PIPEMAST




16' PIPEMAST



20' PIPEMAST

inches 0 1 2 3 4

millimeters 0 1 2 3 4 5 6 7 8

 Fisheries and Oceans Canada Canadian Coast Guard	Pêches et Océans Canada Garde côtière Canadienne

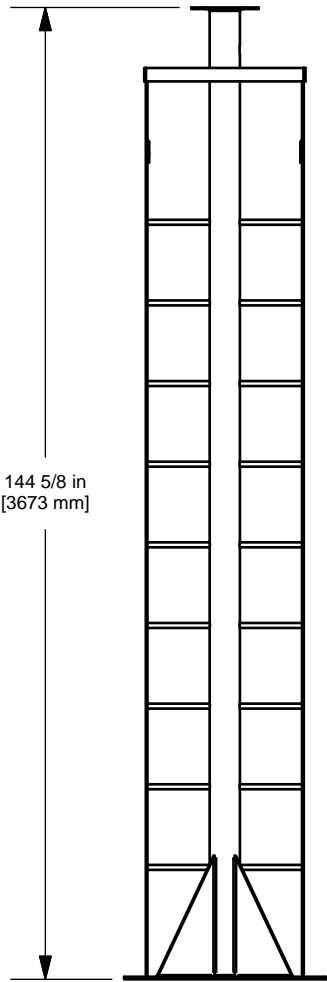
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Drawing - Dessin	

designed - conception	BH	date	2017-12-11
approved - approuvé	BY	date	2017-12-11
drawing no. - no. dessin	EWTM-8010-6	sheet-feuille	1/25
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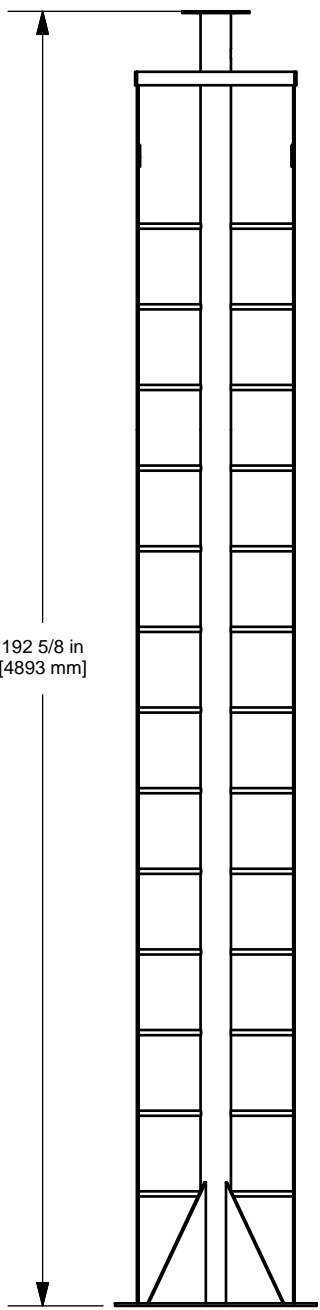
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inches  
0  
1  
2  
3  
4  
pouces

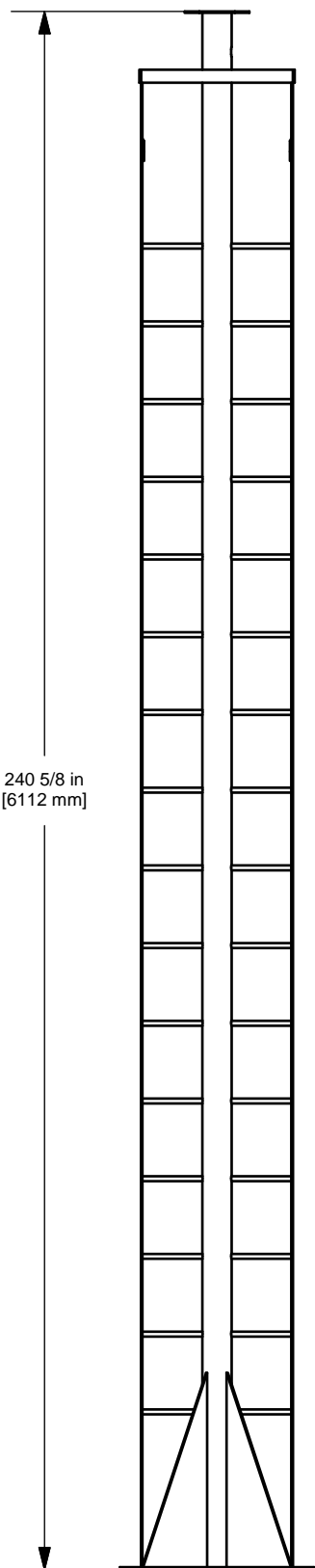
millimeters  
0  
1  
2  
3  
4  
5  
6  
7  
8  
millimètres




144 5/8 in  
[3673 mm]



192 5/8 in  
[4893 mm]



240 5/8 in  
[6112 mm]

 Fisheries and Oceans Canada  Canadian Coast Guard	Pêches et Océans Canada  Garde côtière Canadienne

Asset - Actif	<h2>12', 16', AND 20' PIPEMASTS</h2>		designed - conception	date
Drawing - Dessin			approved - approuvé	date
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designed - conception	date	
BH	2017-12-11	
approved - approuvé	date	
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drawing no. - no. dessin	sheet-feuille	rev
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